

Attorney Docket No.: 0160112  
Application Serial No.: 10/799,533

List of Claims:

1. (previously presented) A method of processing speech comprising:  
obtaining an input wideband speech signal including a background noise;  
decomposing said input wideband speech signal into a voiced portion and a noisy portion  
using an adaptive separation component having a filter cut-off frequency, wherein said voiced  
portion is a portion of said input wideband speech signal for waveform matching and said noisy  
portion is a portion of said input wideband speech signal not for waveform matching, and  
wherein said filter cut-off frequency is above 4 kHz;

processing said voiced portion of said input wideband speech signal to obtain a first set of  
parameters using analysis by synthesis approach; and

processing said noise portion of said input wideband speech signal to obtain a second set  
of parameters using open loop approach;

transmitting said first set of parameters, said second set of parameters and a voicing index  
to a decoder, wherein said voicing index provides said filter cut-off frequency to said decoder for  
a wideband signal composition.

2. (previously presented) The method of claim 1, further comprising removing said  
background noise from said input wideband speech signal before decomposing said input  
wideband speech signal into said voiced portion and said noisy portion.

3. (original) The method of claim 1, wherein said separation component is a lowpass  
filter.

Attorney Docket No.: 0160112  
Application Serial No.: 10/799,533

4. (previously presented) The method of claim 3, wherein bandwidth of said lowpass filter is dependent upon a characteristic of said input wideband speech signal.
5. (previously presented) The method of claim 4, wherein said characteristic of said input wideband speech signal is pitch correlation.
6. (previously presented) The method of claim 4, wherein said characteristic of said input wideband speech signal is gender of a person uttering said input wideband speech signal.
7. (original) The method of claim 1, wherein said analysis by synthesis approach is a Code Excited Linear Prediction (CELP) process.
8. (previously presented) The method of claim 1, wherein said first set of parameters comprises pitch of said voiced portion of said input wideband speech signal.
9. (previously presented) The method of claim 1, wherein said first set of parameters comprises excitation of said voiced portion of said input wideband speech signal.
10. (previously presented) The method of claim 1, wherein said first set of parameters comprises energy of said voiced portion of said input wideband speech signal.
11. (previously presented) The method of claim 1, wherein said second set of parameters

Attorney Docket No.: 0160112  
Application Serial No.: 10/799,533

comprises characteristics of a voicing index of said input wideband speech signal.

12. (cancelled)

13. (previously presented) The method of claim 1, wherein said decoder device uses said information regarding said first set of parameters to synthesize said voiced portion of said input wideband speech signal.

14. (cancelled)

15. (previously presented) The method of claim 1, wherein said decoder device uses said information regarding said second set of parameters to synthesize said noise portion of said input wideband speech signal.

16. (cancelled)

17. (previously presented) An apparatus for processing speech comprising:  
a receiver module for receiving an input wideband speech signal including a background noise;

an adaptive separation module having a filter cut-off frequency for separating said input wideband speech signal into a voiced portion and a noisy portion, wherein said voiced portion is a portion of said input wideband speech signal for waveform matching and said noisy portion is a portion of said input wideband speech signal not for waveform matching, and wherein said filter

Attorney Docket No.: 0160112  
Application Serial No.: 10/799,533

cut-off frequency is above 4 kHz;

an analysis-by-synthesis module for processing said voiced portion of said input wideband speech signal to obtain a first set of parameters; and

an open loop analysis module for processing said noise portion of said input wideband speech signal to obtain a second set of parameters;

a transmitting module for transmitting said first set of parameters, said second set of parameters and a voicing index to a decoder, wherein said voicing index provides said filter cut-off frequency to said decoder for signal composition.

18. (previously presented) The apparatus of claim 17, wherein said background noise is removed from said input wideband speech signal before separating said input wideband speech signal into said voiced portion and said noisy portion.

19. (original) The apparatus of claim 17, wherein said separation module is a lowpass filter.

20. (previously presented) The apparatus of claim 19, wherein bandwidth of said lowpass filter is dependent on a characteristic of said input wideband speech signal.

21. (previously presented) The apparatus of claim 20, wherein said characteristic of said input wideband speech signal is pitch correlation.

22. (previously presented) The apparatus of claim 20, wherein said characteristic of said

Attorney Docket No.: 0160112  
Application Serial No.: 10/799,533

input wideband speech signal is gender of a person uttering said input wideband speech signal.

23. (original) The apparatus of claim 17, wherein said analysis-by-synthesis processor is a Code Excited Linear Prediction (CELP) process.

24. (previously presented) The apparatus of claim 17, wherein said first set of parameters comprises pitch of said voiced portion of said input wideband speech signal.

25. (previously presented) The apparatus of claim 17, wherein said first set of parameters comprises excitation of said voiced portion of said input wideband speech signal.

26. (previously presented) The apparatus of claim 17, wherein said first set of parameters comprises energy of said voiced portion of said input wideband speech signal.

27. (previously presented) The apparatus of claim 17, wherein said second set of parameters comprises characteristics of a voicing index of said input wideband speech signal.

28. (cancelled)

29. (previously presented) The apparatus of claim 17, wherein said decoder device uses said information regarding said first set of parameters to synthesize said voiced portion of said input wideband speech signal.

Attorney Docket No.: 0160112  
Application Serial No.: 10/799,533

30. (cancelled)

31. (previously presented) The apparatus of claim 17, wherein said decoder device uses said information regarding said second set of parameters to synthesize said noise portion of said input wideband speech signal.

32. (cancelled)

33. (previously presented) An apparatus for synthesizing speech comprising:

a first module for obtaining a first set of parameters regarding a voiced portion of an input wideband speech signal;

a second module for obtaining a second set of parameters regarding a noisy portion of said input wideband speech signal;

a third module for obtaining a voicing index, wherein said voicing index provides a filter cut-off frequency for signal composition, wherein said voiced portion is a portion of said input wideband speech signal for waveform matching and said noisy portion is a portion of said input wideband speech signal not for waveform matching, and wherein said filter cut-off frequency is above 4 kHz;

a fourth module for synthesizing said voiced portion of said input wideband speech signal from said first set of parameters;

a fifth module for synthesizing said noise portion of said input wideband speech signal from said second set of parameters; and

a sixth module for combining said synthesized voiced portion and said synthesized noise

Attorney Docket No.: 0160112  
Application Serial No.: 10/799,533

portion based on said filter cut-off frequency for signal composition to produce a synthesized version of said wideband input speech signal.

34. (previously presented) The apparatus of claim 33, wherein said first set of parameters comprises pitch of said voiced portion of said wideband input speech signal.

35. (previously presented) The apparatus of claim 33, wherein said first set of parameters comprises excitation of said voiced portion of said wideband input speech signal.

36. (previously presented) The apparatus of claim 33, wherein said first set of parameters comprises energy of said voiced portion of said wideband input speech signal.

37. (cancelled)

38. (cancelled)

39. (original) The apparatus of claim 33, wherein said synthesized noise portion is estimated.

40. (previously presented) A method for synthesizing speech comprising:  
obtaining a first set of parameters regarding a voiced portion of an input wideband speech signal;  
obtaining a second set of parameters regarding a noisy portion of said input speech signal;

Attorney Docket No.: 0160112  
Application Serial No.: 10/799,533

obtaining a voicing index, wherein said voicing index provides a filter cut-off frequency for signal composition, wherein said voiced portion is a portion of said input wideband speech signal for waveform matching and said noisy portion is a portion of said input wideband speech signal not for waveform matching, and wherein said filter cut-off frequency is above 4 kHz;

synthesizing said voiced portion of said wideband input speech signal from said first set of parameters;

synthesizing said noise portion of said input wideband speech signal from said second set of parameters; and

combining said synthesized voiced portion and said synthesized noise portion based on said filter cut-off frequency for signal composition to produce a synthesized version of said wideband input speech signal.

41. (previously presented) The method of claim 40, wherein said first set of parameters comprises pitch of said voiced portion of said wideband input speech signal.

42. (previously presented) The method of claim 40, wherein said first set of parameters comprises excitation of said voiced portion of said wideband input speech signal.

43. (previously presented) The method of claim 40, wherein said first set of parameters comprises energy of said voiced portion of said wideband input speech signal.

44. (cancelled)



Attorney Docket No.: 0160112  
Application Serial No.: 10/799,533

45. (cancelled)

46. (original) The method of claim 40, wherein said synthesized noise portion is estimated.

47. (cancelled)

48. (previously presented) The method of claim 1, wherein said filter cut-off frequency is communicated to said decoder using a plurality of bits in said voicing index to indicate to said decoder which filter to use for said signal decomposition.

49. (previously presented) The method of claim 1, wherein said voicing index defines a plurality of low pass filters.

50. (cancelled)

51. (previously presented) The apparatus of claim 17, wherein said filter cut-off frequency is communicated to said decoder using a plurality of bits in said voicing index to indicate to said decoder which filter to use for said signal decomposition.

52. (previously presented) The apparatus of claim 17, wherein said voicing index defines a plurality of low pass filters.

Attorney Docket No.: 0160112  
Application Serial No.: 10/799,533

53. (previously presented) The apparatus of claim 33, wherein said filter cut-off frequency is communicated using a plurality of bits in said voicing index to indicate which filter to use for said signal decomposition.

54. (previously presented) The apparatus of claim 33, wherein said voicing index defines a plurality of low pass filters.

55. (previously presented) The method of claim 40, wherein said filter cut-off frequency is communicated using a plurality of bits in said voicing index to indicate which filter to use for said signal decomposition.

56. (previously presented) The method of claim 40, wherein said voicing index defines a plurality of low pass filters.